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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

Marine Flora and Fauna of the Northeastern United States. Crustacea: Stomatopoda

RAYMOND B. MANNING

PENNSYLVANIA STATE UNIVERSITY
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341. Report of the Bureau of Commercial Fisheries Biological Laboratory, Beaufort, N.C., for the fiscal year ending June 30, 1968. By the Laboratory staff. August 1970, iii + 24 pp., 11 figs., 16 tables.

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344. Bureau of Commercial Fisheries Tropical Atlantic Biological Laboratory progress in research 1965-69, Miami, Florida. By Ann Weeks. October 1970, iv + 65 pp., 53 figs.

346. Sportsman's guide to handling, smoking, and preserving Great Lakes coho salmon. By Shearon Dudley, J. T. Graikoski, H. L. Seagran, and Paul M. Earl. September 1970, iii + 28 pp., 15 figs.

347. Synopsis of biological data on Pacific ocean perch, *Sebastodes alutus*. By Richard L. Major and Herbert H. Shippen. December 1970, iii + 38 pp., 31 figs., 11 tables.

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FOREWORD

This issue of the "Circulars" is part of a subseries entitled "Marine Flora and Fauna of the Northeastern United States." This subseries will consist of original, illustrated, modern manuals on the identification, classification, and general biology of the estuarine and coastal marine plants and animals of the Northeastern United States. Manuals will be published at irregular intervals on as many taxa of the region as there are specialists willing to collaborate in their preparation.

The manuals are an outgrowth of the widely used "Keys to Marine Invertebrates of the Woods Hole Region," edited by R. I. Smith, published in 1964, and produced under the auspices of the Systematics-Ecology Program, Marine Biological Laboratory, Woods Hole, Mass. Instead of revising the "Woods Hole Keys," the staff of the Systematics-Ecology Program decided to expand the geographic coverage and bathymetric range and produce the keys in an entirely new set of expanded publications.

The "Marine Flora and Fauna of the Northeastern United States" is being prepared in collaboration with systematic specialists in the United States and abroad. Each manual will be based primarily on recent and ongoing revisionary systematic research and a fresh examination of the plants and animals. Each major taxon, treated in a separate manual, will include an introduction, illustrated glossary, uniform originally illustrated keys, annotated check list with information when available on distribution, habitat, life history, and related biology, references to the major literature of the group, and a systematic index.

These manuals are intended for use by biology students, biologists, biological oceanographers, informed laymen, and others wishing to identify coastal organisms for this region. In many instances the manuals will serve as a guide to additional information about the species or the group.

Geographic coverage of the "Marine Flora and Fauna of the Northeastern United States" is planned to include organisms from the headwaters of estuaries seaward to approximately the 200-m depth on the continental shelf from Maine to Virginia, but may vary somewhat with each major taxon and the interests of collaborators. Whenever possible representative specimens dealt with in the manuals will be deposited in reference collections of the Gray Museum, Marine Biological Laboratory, and other universities and research laboratories in the region.

After a sufficient number of manuals of related taxonomic groups have been published, the manuals will be revised, grouped, and issued as special volumes. These volumes will thus consist of compilations of individual manuals within phyla such as the Coelenterata, Arthropoda, and Mollusca, or of groups of phyla.

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MARINE FLORA AND FAUNA OF THE NORTHEASTERN UNITED STATES. Crustacea: Stomatopoda

RAYMOND B. MANNING[1]

ABSTRACT

This manual includes an introduction on the general biology, an illustrated key, an annotated systematic list, a selected bibliography, and an index to the stomatopod Crustacea of the inner continental shelf of the Northeastern United States. Four species are treated.

INTRODUCTION

The crustacean order Stomatopoda is a small group of primitive crustaceans found almost exclusively in shallow tropical waters. More than 300 species in four families are known. Although 70 species have been recognized in the western Atlantic, only four are found in the Northeastern United States. Two of these, *Nannosquilla grayi* (Chace) and *Squilla empusa* Say, live in shallow water, whereas the other two, *Heterosquilla armata* (Smith) and *Platysquilla enodis* (Manning), live in depths of 30 m or more. All four species are included in the key given below.

The stomatopods or mantis shrimps can be recognized by the presence of two anterior movable somites bearing eyes and triramous antennules, a carapace which covers the anterior portion of the cephalothorax dorsally but leaves the four posterior thoracic somites (No. 5-8) free, five pairs of subchelate thoracic appendages (one of which is greatly enlarged as a raptorial claw), and abdominal gills (Fig. 1). The common name of these organisms, mantis shrimps, alludes to the resemblance of the raptorial claws to those of the praying mantis (Fig. 2).

Adult stomatopods are primarily benthic organisms that usually live in burrows. So far as is known, all species are predators, and some leave their burrows at night to feed. The female carries the oval egg mass between her maxillipeds until the young hatch.

The planktonic larvae, known as alima or erichthus larvae, go through a number of distinct stages before settling on the botton; each species may have as many as 10 separate larval stages. The larvae of most species are unknown.

Our knowledge of most aspects of the general biology of stomatopods and their interrelationships with other organisms at best can be characterized as scanty. Often our knowledge is restricted to the external morphology of a few individuals of a species. For example, many of the specimens of the two species, *Heterosquilla armata* and *Platysquilla enodis,* known from deeper waters off the Northeastern United States were found in stomach contents of fishes, and this is practically all that we know about these species; *P. enodis* is known from parts of three specimens. In contrast, specimens of the other two species, *Nannosquilla grayi* and *Squilla empusa,* living off the Northeastern United States are comparatively common. Judging from collections made by M. B. Gray in the 1950's, *Nannosquilla grayi* was abundant in the Bass River, Yarmouth, Cape Cod, and material might be collected readily for a variety of studies. Similarly, *Squilla empusa,* which seems to be abundant throughout its range, could serve as the subject for many investigations.

[1] National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.

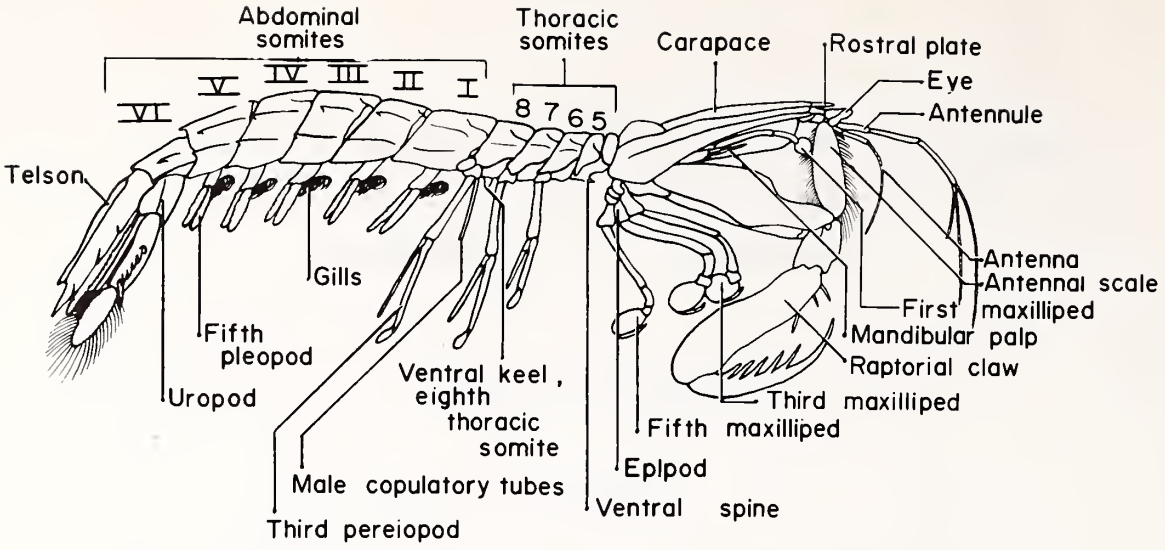

Figure 1.—Morphological structures and terms used in descriptive accounts of stomatopods (from Manning, 1969).

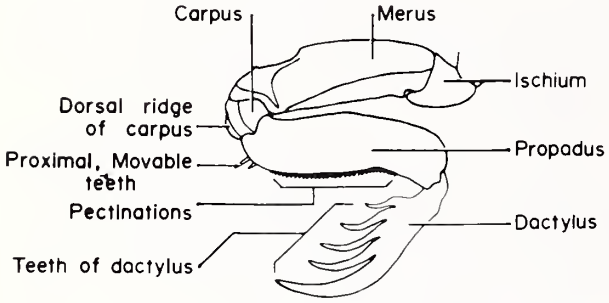

Figure 2.—Structure of raptorial claw (from Manning, 1969).

KEY TO STOMATOPODA OF THE NORTHEASTERN UNITED STATES

1. Carapace with median carina terminating anteriorly in a bifurcation (Fig. 3). Telson lacking movable marginal teeth.
Family Squillidae:..... *Squilla empusa*

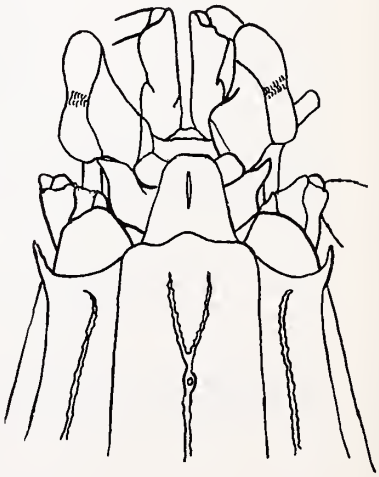

Figure 3.—*Squilla empusa*. Anterior portion of body, dorsal view.

1. Carapace lacking median carina. Telson with one pair of movable marginal teeth. Family Lysiosquillidae..... 2

2 *(1)* Posterior armature of telson submarginal, not completely visible in dorsal view. (Fig. 4, 5) ..... *Nannosquilla grayi*

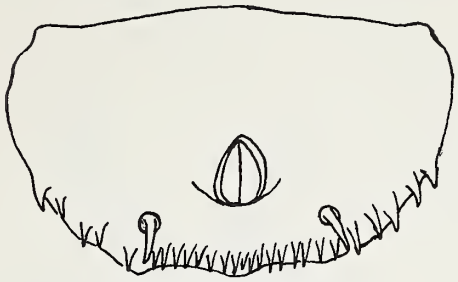

Figure 4.—*Nannosquilla grayi*. Telson in ventral view.

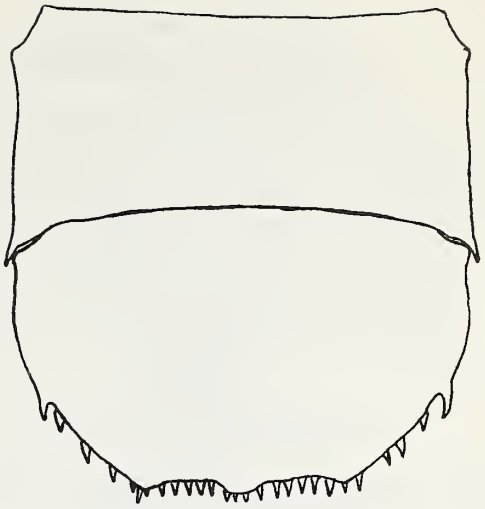

Figure 5.—*Nannosquilla grayi*. Sixth abdominal somite and telson in dorsal view.

2 *(1)* Marginal armature of telson entirely visible in dorsal view 3

3 *(2)* Telson with four pairs of fixed marginal projections (Fig. 6). Posterior margin of abdominal somites and dorsal surface of telson smooth ..... *Platysquilla enodis*

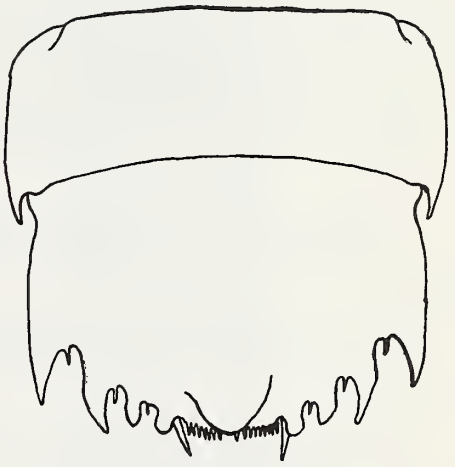

Figure 6.—*Platysquilla enodis*. Sixth abdominal somite and telson in dorsal view.

3 *(2)* Telson with two pairs of fixed marginal projections (Fig. 7). Posterior margin of fourth, fifth, and sixth abdominal somites and dorsal surface of telson with spinules. ..... *Heterosquilla armata*

Figure 7.—*Heterosquilla armata*. Sixth abdominal somite and telson in dorsal view.

ANNOTATED LIST
ORDER STOMATOPODA

Family SQUILLIDAE

Squilla empusa Say, 1818. (Fig. 3, 8). Massachusetts to northern South America in depths to 154 m, usually in shallower water. This is the most common American species of *Squilla*. Size moderate to large, total length of adults to 185 mm.

Family LYSIOSQUILLIDAE

Heterosquilla armata (Smith, 1881). (Fig. 7, 9). Off New England in 96-218 m. Rare. Size moderate, total length of adults 20-70 mm.

Nannosquilla grayi (Chace, 1958). (Fig. 4, 5, 10). Off Massachusetts and Georgia, sublittoral to 15 m. Common in Bass River, Yarmouth, Mass., where it was first found by M. B. Gray. Size small, total length of adults 20-42 mm.

Platysquilla enodis (Manning, 1962). (Fig. 6). Off Vineyard Sound and North Carolina, in 31-49 m. This species is known only from specimens collected in the late 1800's. Size moderate, total length of adults about 60 mm.

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SMITH, R. I. (chief editor).
1964. Keys to marine invertebrates of the Woods Hole region. Systematics-Ecology Program, Mar. Biol. Lab., Woods Hole, Mass., Contrib. No. 11, x + 208 p.

INDEX TO SCIENTIFIC NAMES

Heterosquilla armata 1, 3, 4
Nannosquilla grayi 1, 3, 4
Platysquilla enodis 1, 3, 4
Squilla empusa 1, 2, 4

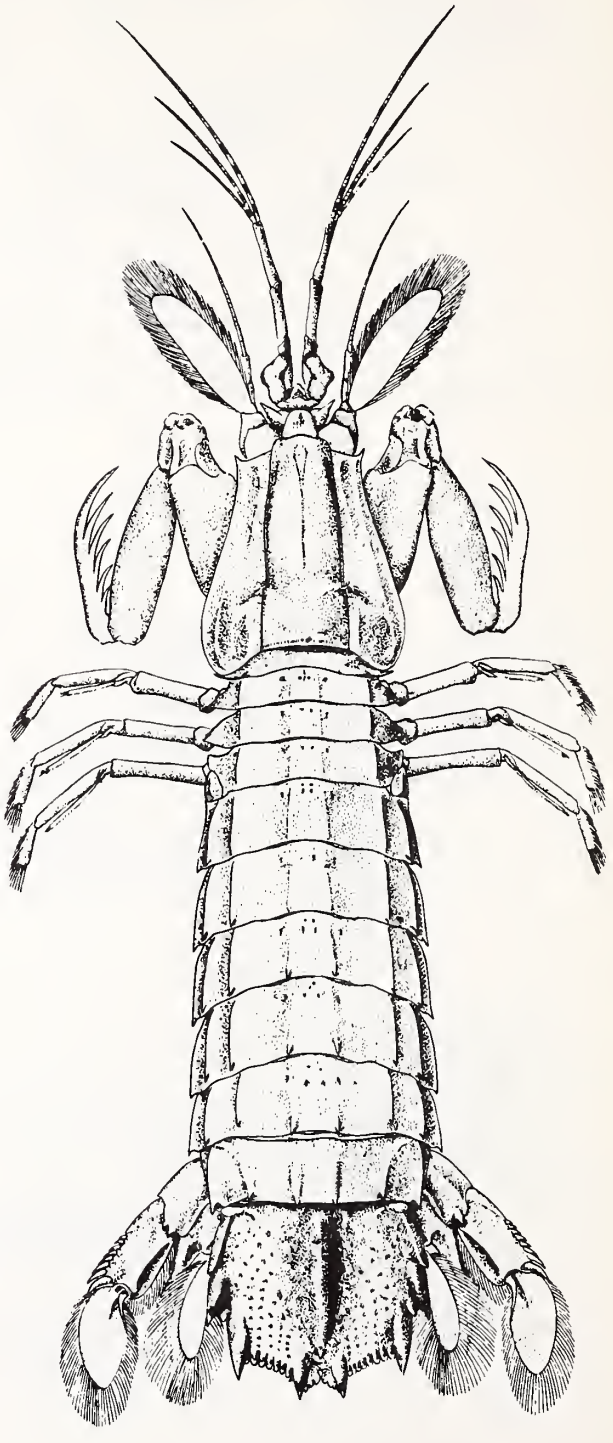

Figure 8.—*Squilla empusa*. Dorsal view (from Manning, 1969).

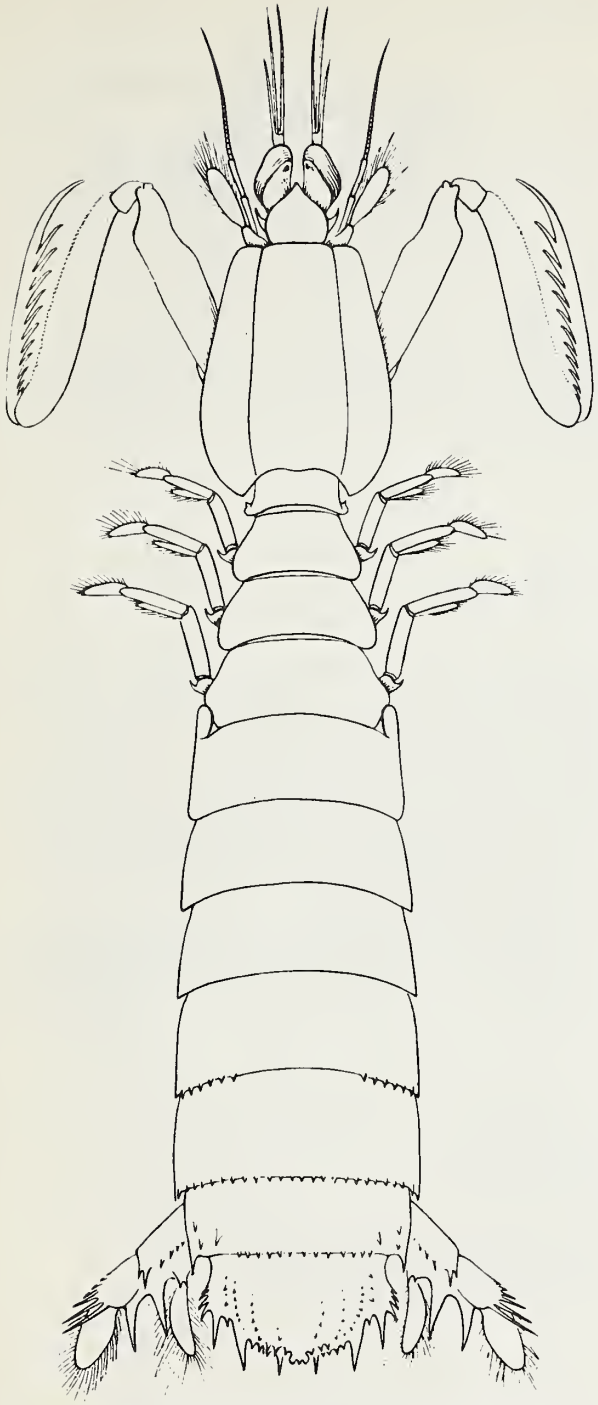

Figure 9.—*Heterosquilla armata*. Dorsal view (from Manning, 1969). Specimen 3.8 cm long.

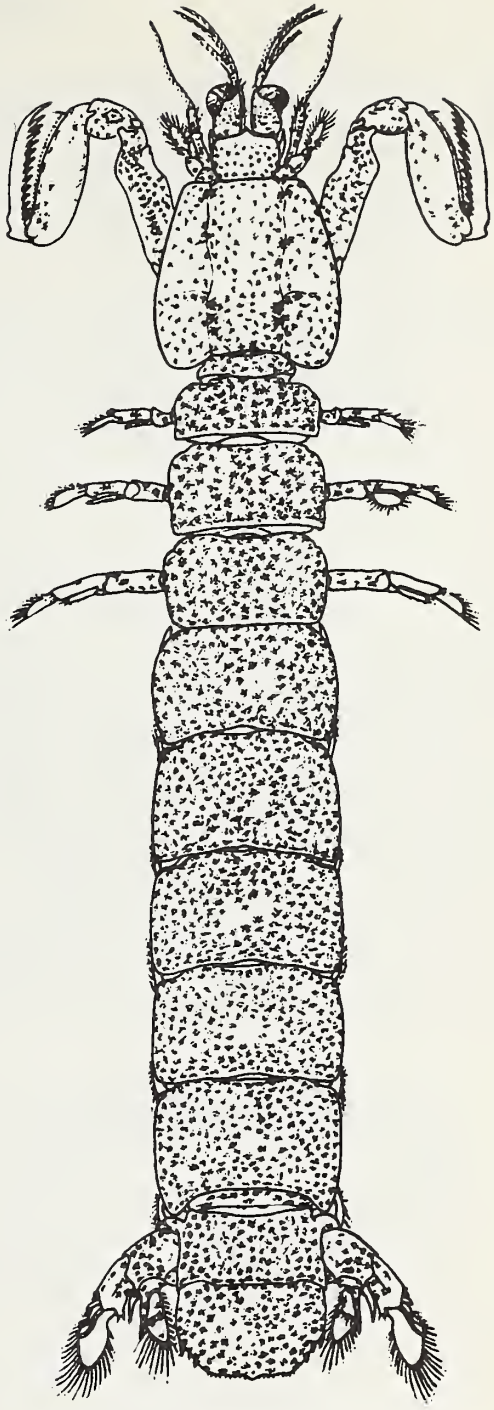

Figure 10.—*Nannosquilla grayi*. Dorsal view (from Chace, 1958). Specimen 4 cm long.

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Preparation of the "Marine Flora and Fauna of the Northeastern United States" is being coordinated by the following Board:

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Robert T. Wilce, Department of Botany, University of Massachusetts, Amherst, Mass.

The Board established the format for the "Marine Flora and Fauna of the Northeastern United States," invites systematists to collaborate in the preparation of manuals, reviews manuscripts, and advises the Scientific Editor of the National Marine Fisheries Service.

COORDINATOR'S COMMENTS

Publication of the "Marine Flora and Fauna of the Northeastern United States" is most timely in view of the growing universal emphasis on environmental work and the urgent need for more precise and complete identification of coastal organisms than has been available. It is mandatory, wherever possible, that organisms be identified accurately to species. Accurate scientific names unlock the great quantities of biological information stored in libraries, obviate duplication of research already done, and make possible prediction of attributes of organisms that have been inadequately studied.

Raymond B. Manning began his study of the Stomatopoda of the Western North Atlantic in 1957 as a graduate student at the Institute of Marine Sciences, University of Miami. His studies on the American species were subsequently expanded to include investigations on all of the known species, the majority of which live in the Indo-West Pacific region. His studies have resulted in more than 50 papers on the systematics of stomatopods, including three reviews of classification at the generic level, and a monographic revision of the western Atlantic species which was published in 1969. After completing his graduate studies at the University of Miami, Manning joined the staff of the National Museum of Natural History, Smithsonian Institution, in 1963.

Manuals are available for purchase from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The manuals so far published in the series are listed below.

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